What is claimed is:

1. A motor-driven compressor incorporated in an air conditioning system, for compressing and supplying a refrigerant to a refrigerant circuit of the air conditioning system, and receiving the refrigerant from the refrigerant circuit after the refrigerant is used for cooling, said motor-driven compressor comprising:

an electric motor including

a motor housing defining an armature chamber therein, and

an armature housed in the armature chamber;

a compression unit driven by said electric motor, said compression unit including

a unit housing in which are defined a suction chamber for receiving the refrigerant from the refrigerant circuit, a discharge chamber for supplying the compressed refrigerant to the refrigerant circuit, and a rotor chamber accommodating a rotating member rotated by said electric motor, and

a compression mechanism housed in the unit housing, the compression mechanism compressing the refrigerant sucked therein from the suction chamber and discharging the compressed refrigerant to the discharge chamber as the rotating member rotates; and

a cooling channel for guiding the refrigerant returned from the refrigerant circuit to the suction chamber, said cooling channel including the armature chamber, and a downstream section extending from the armature chamber to the suction chamber in such a manner that the downstream section is separated from the rotor chamber.

2. The motor-driven compressor according to claim 1, wherein the armature of said electric motor has a motor shaft extending through the rotor chamber, and

said compression mechanism includes a swash plate arranged in the rotor chamber and rotated by the motor shaft, and a plurality of pistons reciprocated by rotation of the swash plate to perform a refrigerant suction stroke and a refrigerant compression stroke.

3. The motor-driven compressor according to claim 2, wherein said cooling channel includes an upstream section connecting between the refrigerant circuit and the armature chamber and having an inlet port formed in the motor housing.

4. The motor-driven compressor according to claim 3, wherein said inlet port is located near an end wall of the motor housing which is located opposite the unit housing.

5. The motor-driven compressor according to claim 3, wherein said unit housing has a peripheral wall surrounding the rotor chamber and the compression mechanism, and

the downstream section of said cooling channel includes an axial passage formed in the peripheral wall of the unit housing and extending parallel with the motor shaft.

6. The motor-driven compressor according to claim 5, wherein said motor housing and said unit housing are coupled together in close contact with each other, and

the downstream section of said cooling channel further includes a connection passage formed in the motor housing and connecting between the armature chamber and the axial passage.

7. The motor-driven compressor according to claim 3, wherein the downstream section of said cooling channel includes a pipe member extending inside the unit housing in parallel with the motor shaft.

8. The motor-driven compressor according to claim 7, wherein said pipe member has a portion extending through

the rotor chamber.

9. The motor-driven compressor according to claim 3, wherein the downstream section of said cooling channel includes an internal passage formed in the motor shaft.

10. The motor-driven compressor according to claim 9, wherein the downstream section of said cooling channel further includes a connection passage formed in the unit housing and connecting between the internal passage and the suction chamber.

11. The motor-driven compressor according to claim 3, wherein the downstream section of said cooling channel includes an outlet port formed in the motor housing and communicating with the armature chamber, a second inlet port formed in the unit housing and communicating with the suction chamber, and an external pipe connecting between the outlet port and the second inlet port, said external pipe extending outside of the unit housing.